

Title: How to Properly Store, Transport, and Install Avery Reflective Signage:

A Field Guide

Forward: The following booklet is a brief guide to the proper storage, transportation, and installation of highway signage featuring Avery Dennison Reflective Films. It is intended to be used as a tool, primarily for contractors and installers of both flat stock, and extruded panel signage. For instruction on converting Avery Dennison Reflective Films in the sign fabrication process, please refer to our Technical Bulletins.

The main focus of this booklet is to assist in the installation process of highway signs. When an agency chooses an Avery Dennison Reflective Film to cover a substrate, we would like to ensure that the end result is a clear, legible sign that will last for the duration of the warranty. With specifications put in place by state and government Departments of Transportation, our role is to see that all aspects of the contracts are followed closely, and the end results are satisfactory to all parties involved. Not only does this include proper fabrication techniques, but proper shipping, storage, handling and installation as well.

By not following the proper techniques explained in this guide, the results may be that a sign will not deliver the message it was intended to give to a driver, in a clear, unobstructed manner. Some factors that may take away from the intended performance of the signs are dents, scratches, dirt and oil residues, wrinkles, or bends in the panels. Most flaws acquired in the shipping or installation of the signage, will stay for the life of the sign, causing the daytime image to appear marred, and the nighttime reflectivity to be affected. Any permanent variations to the surface of the reflective sheeting will lessen its ability to give drivers the proper information in the way it was designed to be given- bold by day, and bright by night.

Topics:

Section 1: Proper Storage

- Storage of Flat Stock Signage

- What Happens if the Signs Becomes Wet?

- Storage of Overhead or Guide Signs

Section 2: Handling and Installation

- Transportation Notes for Flat Stock Signage

- Tools and Installation Techniques for Flat Stock Signage

- Transportation Notes for Overhead or Guide Signs

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- Additional Safety Checks

Section 1: Proper Storage of Signs

Flat Stock Signage Arrival and Storage Techniques

Signs should arrive from the fabricator in boxes, or hand made frames. They should arrive dry, and should be sorted upon arrival to ensure the proper signs were shipped. (Figure 1)



Figure 1

Signs should arrive with either slip sheeting or foam padding between them to reduce the risk of abrasions during shipment. If signs arrive without proper padding inspect all signs prior to acceptance, as these damages will most likely be permanent.

These signs should not be stacked (Figure 2), rather stored on edge in a dry environment (Figure 3). Stacking signs flat may compress either the glass beads, or prisms in the sheeting, resulting in a loss of necessary reflectivity.



Figure 2



Figure 3

Be sure to keep the padding materials between the sign faces when storing signs on edge. Removing the padding may result in the

compression of sheeting on the signs bearing the most weight. This would most likely be the signs closest to the wall or support they are leaning against.

If signs are to be leaned against a surface that is not the entire width of the sign, like a beam or post, be sure that the first sign is facing away from the post, with the non-sheeted side against the support. If the face of the sign is resting against the post, damage will occur at the contact points.

In the same manner, the use of banding is not recommended for T-5500, T-6500, and T-7500 Sheeting. Signs that are banded may adopt the same compression at the pinch points on the signs. These small areas may also lose reflectivity permanently. (Figure 4)

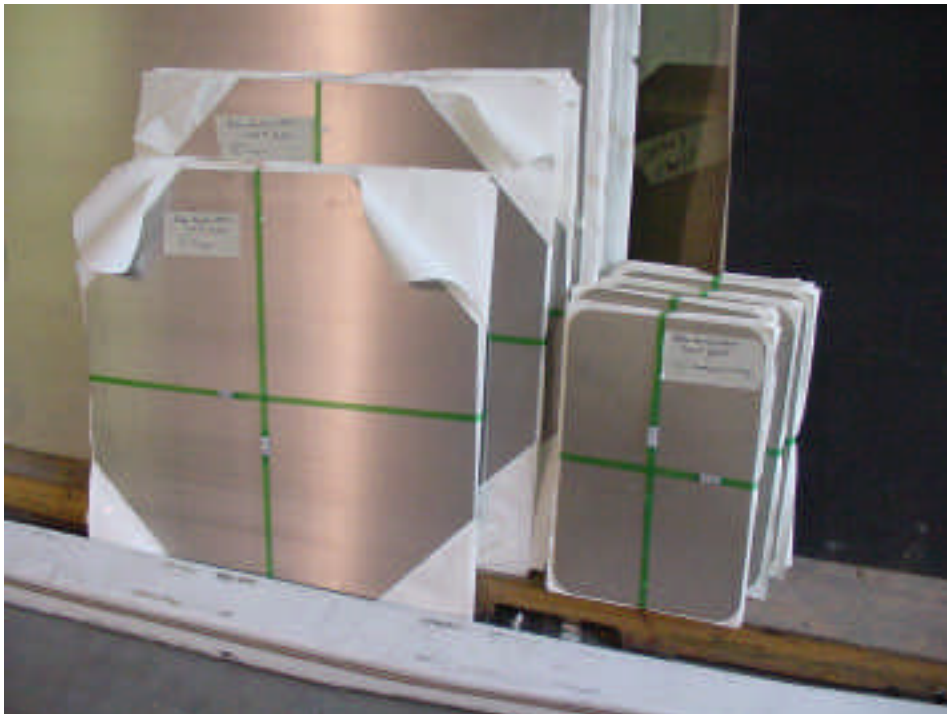


Figure 4

What Happens if the Signs Become Wet?

As mentioned earlier, signs should arrive and be stored in a dry environment, free of both water and high levels of moisture or humidity until installed. **If they are subjected to this environment at any time, it is imperative that the signs be unpacked, and the shipping materials removed from the sign face.** As foam and paper both absorb and retain water, the signs will be permanently damaged if left alone. Possible screened image transfers, and wrinkling of the face stock can occur with a forced presence of water on the surface.

Storing the signs in an enclosed, non-climate-controlled trailer is also not recommended in areas of high heat and humidity. These trailers can have a “greenhouse effect” on the signs within, causing premature weathering and damage to the signs. (Figure 5)



Figure 5

Many have questioned why a sign cannot get wet in storage when it gets wet after installation. The difference is that the amount of moisture that comes in contact with a sign surface due to rain, humidity, or dew is nominal, and tends to run off or evaporate due to air circulation. When trapped between other signs, there is an absence of air flow that would normally assist in the drying process.

It is never recommended that a customer place wet signs in a batch oven, in an attempt to dry them with the packing materials still on them. This act will cause irreversible damage to the signs. Even if the packing materials are removed, signs should be air-dried naturally or with fans, not in an accelerated forced heat environment.

Under normal circumstances, it is recommended that the packing material not be removed from the face of the sign until installation. This gives an extra layer of protection against handling damages on the way to the job site. However, this should be disregarded if the signs become wet at any time during the handling or installation process.

Storage of Overhead or Guide Signs

Guide signs usually arrive from the fabricator in a crated form. These crates are commonly constructed from wood, and resemble a frame for the sign. These signs are usually crated face to face, with an air gap between the signs. If signs arrive loose in the crate, and appear to be touching each other with no padding between them, inspect them for damage before installation.

Guide signs should be stored indoors if they are to sit for a long duration of time. Storing signs in an enclosed, non-climate-controlled trailer is not recommended in a high heat environment, as it can have a negative effect on the desired performance of the sign.

If signs must be stored outside for a long period of time, there must be spacing of at least 4" between the signs. (Figure 6) This air gap will not only allow for proper moisture evaporation, but protection

from compressing the reflective materials as well. It is also very important that the signs are not subjected to water runoffs or downspouts from buildings.



Figure 6

With both indoor and outdoor storage, signs can be left either free standing, or leaning against each other, as long as there is no pressure applied to the reflective face of the sign. A way to accomplish this successfully is to leave the signs in the crates they arrive in. If freestanding racks are available, signs can be removed from the crates and stored upright.

Under no circumstances should the signs be left leaning against each other. Even if foam padding is used, pressure points that compress sheeting and movement from forces such as wind gusts are unavoidable with such heavy substrates. If this damage takes place it is irreversible. (Figure 7)



Figure 7

If signs are to be left outside, it is imperative that they are not resting directly on the ground. The signs should be lifted off of the ground by placing them on non-treated timbers or other materials that will keep them free from standing water, mud, or other surfaces that may cause damage to the signs. (Figure 8) This damage includes not only water and dirt penetration, but dents and uneven setting caused by stones or other ground surfaces.

It is also not recommended to leave signs on the ground, due to the difficulty involved in picking these signs up without possibly bending the panels. Bending of the sign may result in snapping the bolts from behind, or damaging the stiffener bars, both of which may cause permanent damage to the guide sign.

If water or dirt is allowed to be in contact with the signs for an extended period of time, permanent wrinkling, discoloration, or loss of reflectivity is inevitable.



Figure 8

Section 2: Handling and Installation

Transportation Notes for Flat Stock Signage

When preparing to install signs, it is important that the signs are **not** stored outdoors with the packing materials on the face. (Figure 9)



Figure 9

If the packing materials are left on the signs outdoors, installers run the risk of causing permanent damage to the reflective properties of the signage. As paper slip sheeting has the tendency to absorb water and moisture, the damages may not only be to the face stock. If the paper then dries while in contact with the sign, installers run the risk of it bonding to the surface of the sign, making it very difficult, if not impossible, to peel off of the sign face without causing scratches or abrasions to the sign. (Figure 10)



Figure 10

When possible, keep the finished signs in the original shipping crates for transport. If sorting is necessary prior to transporting signs to the job site, keep the signs secured with the proper packing materials between them.

It is not recommended that the signs be transported to the site loose in a container or a truck bed. (Figure 11) Many problems can be caused by this transportation method. Signs will be subjected to permanent damage through bouncing and sliding while in transport.

Also, if the job is not completely installed in one day, moisture, such as dew, can become entrapped between the signs, causing irreversible damage.



Figure 11

Tools and Installation Techniques for Flat Stock Signage

Tools

To properly install Avery Dennison Reflective signage, the following tools are needed: properly sized bolts and nuts, nylon washers, an offset box end wrench, and box end wrench with a ratchet. (Figure 12) Variation from these tools may cause unneeded scratches to the surface of the signs.



Figure 12

Installation

Once the sign is in place, place a nylon washer on the bolt, insert the bolt through the sign face, through the post, and place a nut on the end. Once the nut is hand tightened until snug, grip the bolt head with the offset box wrench and hold firmly. (Figure 13)



Figure 13

With the bolt held firmly from the front, tighten the nut with the box end ratchet from the rear of the sign. **Be careful to not over tighten the nut in the installation process.** This may cause the face sheeting to halo, and rise from the substrate around the plastic washer, causing permanent damage which may lead to the premature aging of the sign.

*It is very important that nylon washers be used, as they will not oxidize or degrade throughout the life of the sign. These nylon washers are available through Avery Dennison.

If the proper installation holes are not present in the desired location, it is permissible to drill holes on site. All holes should be drilled through the face of the sign, to avoid unneeded damage to the face film. (Figure 14) Be certain that the hole location is carefully measured, as this action is impossible to reverse.

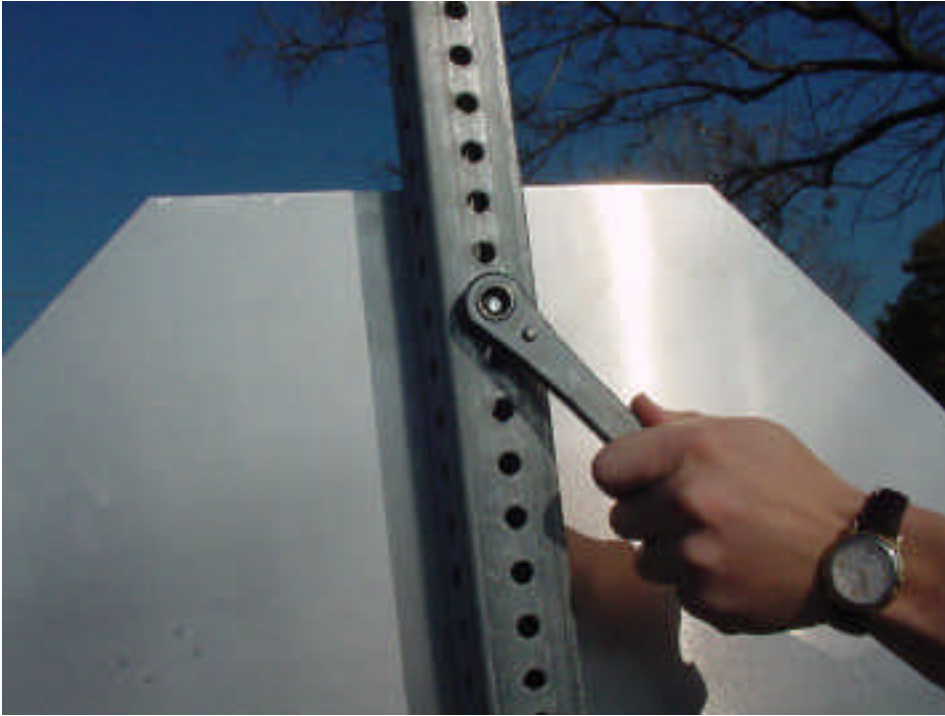


Figure 14

If any aluminum shavings are left on the sign surface, be careful to not scratch the sign face while removing them. Different techniques can be used to accomplish this. Some of these include holding the sign upright and tapping the sign so they fall away, using an air gun to blow the shavings off the face, or using a soft bristled brush to sweep them away. Use of a rag, a hand, or a brush with metal bristles may result in the scratching of the sign surface.

Transportation Notes for Overhead or Guide Signs

Guide signs can be transported to the job site in a number of ways. If they are in the proper installation order, they can be shipped in their original crates. If sorting is necessary, they can be transported in racks specifically designed for these signs. (Figure 15)



Figure 15

Caution must be taken so that the signs are unable to touch or rub against each other in these racks. Damage can occur if they are allowed to do so.

Installation Notes for Overhead or Guide Signage

*** Because states have specified mounting procedures, they will not be discussed in this section. The supports and fastening methods used in mounting these signs vary from state to state. Different bolts, brackets, nuts and other pieces depend on what type of apparatus the sign is being mounted to. Differences in overhead structures as well as roadside mountings prohibit the uniformity of installation nationwide. Information on what mounting equipment should be used, as well as how these signs should be secured, can be found in the respective states' specification or engineering booklets.

Once on the job site, it is important that the stiffener bars are not removed until the sign is completely installed. Signs may buckle in the installation process if they are taken away prematurely. (Figure 16)



Figure 16

Do not attempt to lift these oversized signs without proper vertical bracing on the rear of the sign. If demountable copy or shields are present on the sign, this deflection can cause the rivets to either loosen, or snap, resulting in a damaged sign that would require field repair.

Prior to lifting signs, be sure to check that there are no obstructions that may endanger the lives of the installation crews. These risks are including but not limited to uneven ground for the crane, close moving traffic, or power lines. These all represent a hazard for installation crews and should be avoided at all costs.

Signs can be lifted in a number of ways. Custom rigs with “J” hooks can be used to lift the signs from the top, straps can be used around the stiffener bars, or hooks and clamps can be mounted to the backs of the signs. (Figure 17)



Figure 17

Whenever a sign is lifted, even if there is no prevailing wind, tag lines should be used to steady a sign while moving. These lines can reduce any swinging, or twisting of the sign from either wind, or momentum caused by the crane. (Figure 18)



Figure 18

Also, the fewer times the signs are handled, the better it is for the sign. As the number of loading and unloading increases, so does the risk of damage to the sign face, fasteners, and supports.

Do not strap the signs across the face under any circumstances when lifting. This may cause chipping of the material on the bottom and top of the sign, as well as scratches across the face.

Additional Safety Checks

- Due to the varying sizes and weights of overhead signs, special care should be used in selecting which supporting method will be used.
- Additional caution should be used when any part of the lifting system has welded areas, as these welds must be able to hold the weight of the entire system.
- Whenever a sign is overhead, all workers in the area should be careful to not position themselves in a dangerous spot, such as directly underneath the moving sign, or in an area they cannot escape from freely and quickly, should the sign become loose.